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16

1162627 COMPLETE SPECIFICATION

5 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

Fig.1

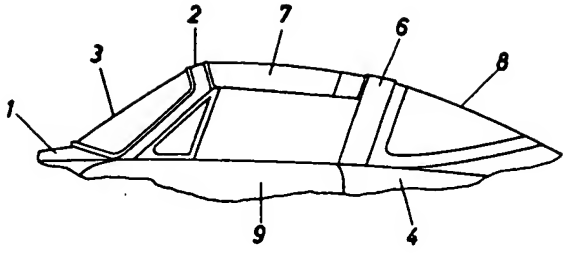
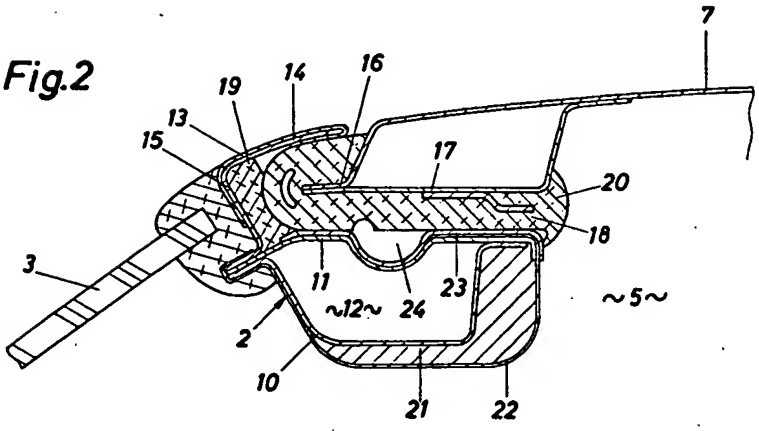


Fig.2



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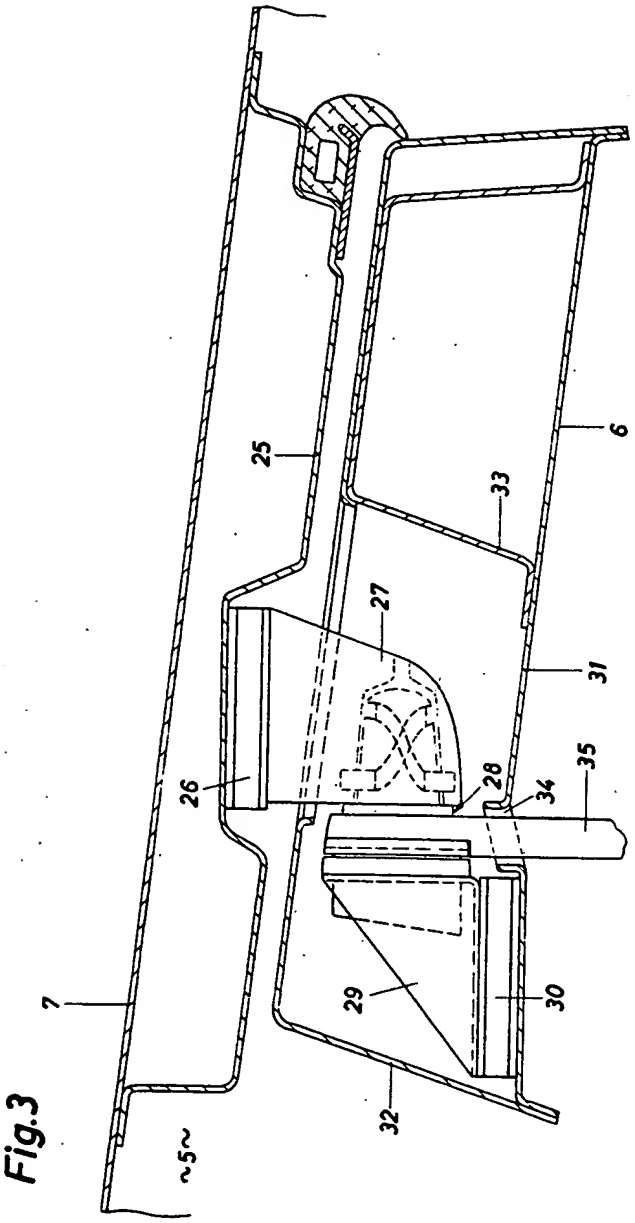

Fig.3

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5 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 3.

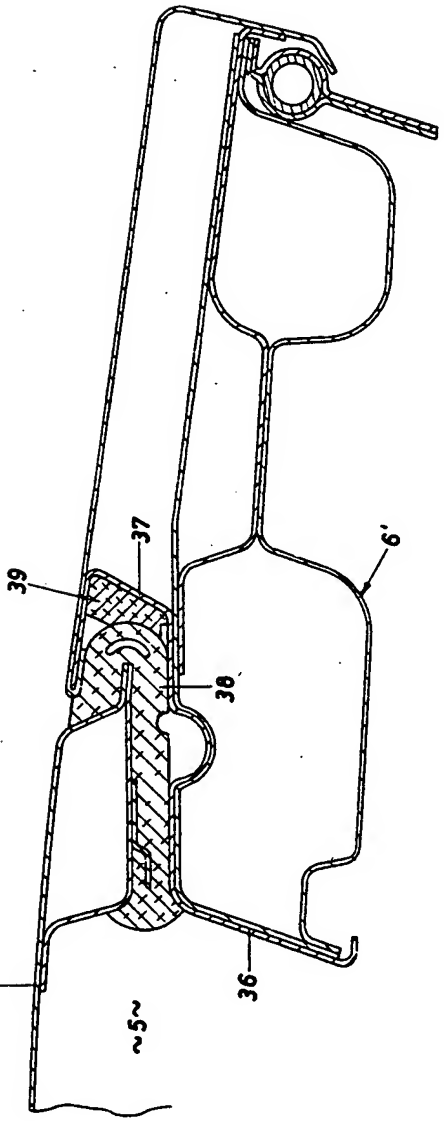


Fig. 4

Fig.5

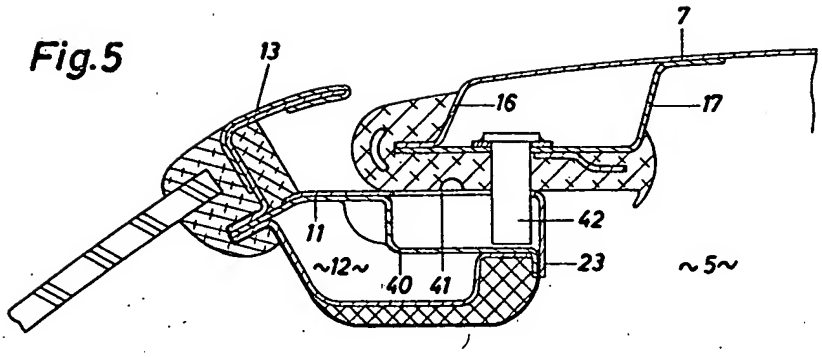
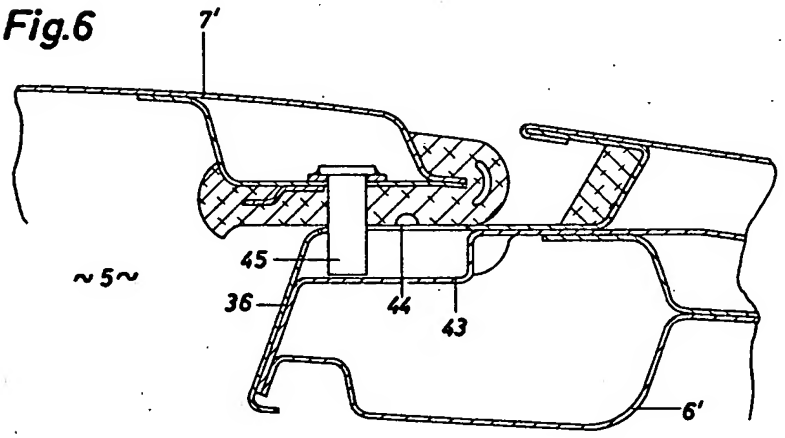


Fig.6



1162627 COMPLETE SPECIFICATION
5 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 5

Fig.7a

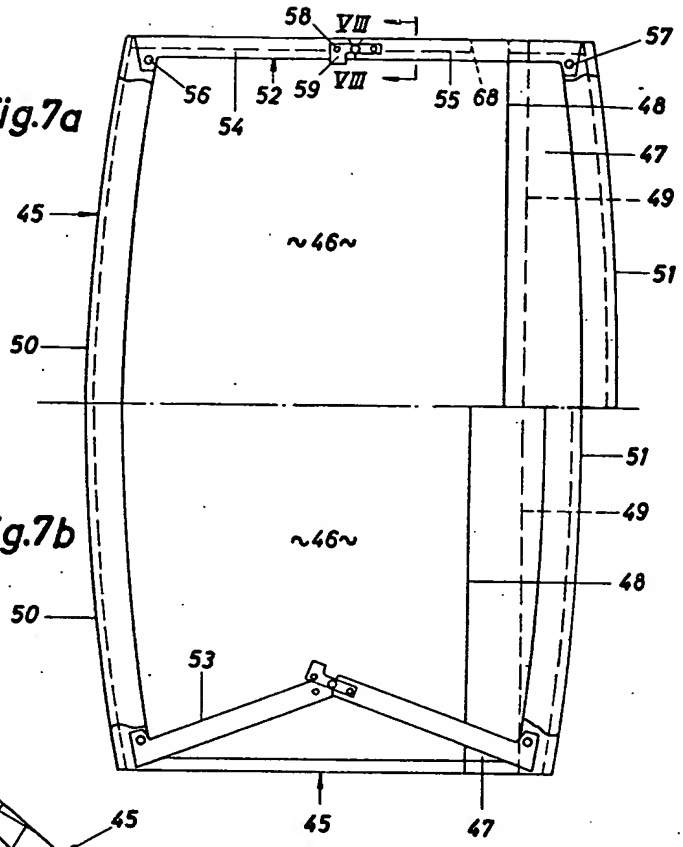


Fig.7b

Fig.8

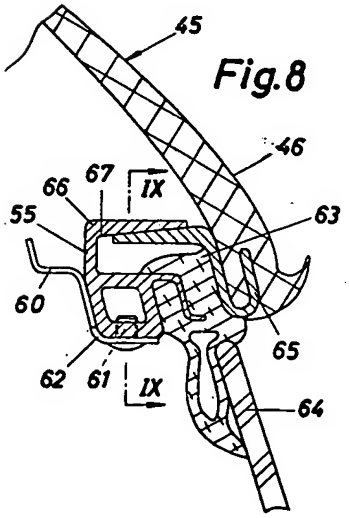
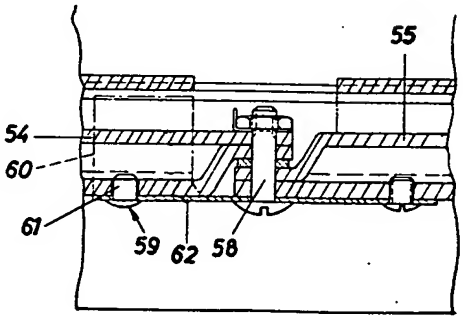


Fig.9



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PATENT SPECIFICATION

DRAWINGS ATTACHED

1,162,627

1,162,627

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No. 28336/68.

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Complete Specification Published: 27 Aug., 1969.

Index at acceptance: —B7 B(2M, 3)

International Classification: —B 60 j 7/10

COMPLETE SPECIFICATION

Removable Roof for Automotive Vehicles

We, DR-ING. h.c.F. PORSCHE KG, of Porschestrasse 42, Stuttgart-Zuffenhausen, Germany, a German Company do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

THE PRESENT INVENTION relates to a removable roof for automotive vehicles.

Passenger automotive vehicles have been provided with a roll yoke transversely spanning the passenger compartment and with a roof extending as a separate structural component between the windshield frame and the roll yoke, with appropriate detachable connections at the windshield frame and the roll yoke. The mounting of the roof to these relatively fixed structural parts of the automobile has proved to be generally unsatisfactory and has considerable disadvantages.

Particularly with sports cars having a passenger space cover of the above-mentioned type, the stresses on the roof caused by the sub-atmospheric pressure within the passenger compartment existing during travel at high speeds are extraordinarily high, particularly at the transition between the windshield frame and the roof. For this reason, locks and other mountings had to be constructed to be particularly strong. However, these structural compensations make it extremely difficult to manipulate the roof for the purpose of removing it from between the windshield frame and the roll yoke and they also increase the weight of the roof.

These disadvantages and others are avoided in accordance with the present invention by providing the windshield frame and/or the roll yoke with a U-shaped channel member opening toward the roof. Preferably, the channel member is constructed of shaped, for example stamped, sheet material components fixedly secured to the windshield frame or the roll yoke. The roof is provided with a marginal transverse edge portion or portions to be inserted into the channel member with a constantly applied force in the assembled position of the roof. With such a construction, the transverse edge or edges of the roof engage underneath fixed structural components of the vehicle body for a particularly satisfactory mounting of the roof, specifically with respect to forces effective at right angles to the plane of the roof; therefore, the latch elements for the roof may be lighter, smaller, and more easily manipulatable than corresponding latch elements of the prior art. Preferably, the marginal edge of the roof is supported in the channel member with the interposition of elastically sealing inserts. These elastic inserts provide for a water-tight connection of the parts and also provide for a small relative displacement between the parts when the structure of the vehicle becomes warped under excessive loads. The channel member is securely attached to the top of a box or hollow frame girder forming the structurally rigid windshield frame and/or roll yoke, respectively. The top side of the girder is provided with an upwardly facing supporting surface to support the marginal edge portion of the roof independently of the channel, which also facilitates the insertion of the roof into the channel. The roof rests on the supporting surface of the girder with the interposition of elastic means, which are provided with a bead projecting into and exposed in the passenger compartment to serve as a shock absorber with respect to the passengers for preventing collision injuries.

To align the roof with respect to the respective fixed structural components of the frame during assembly, additional guiding means are provided on the box girder of the windshield frame of the roll yoke. Particularly, several guides are disposed on the top supporting surface of the respective box

[Price 4s: 6d.]

girder, which guides are in the form of apertures or slots extending in the longitudinal driving direction of the vehicle to cooperate with pins, pegs, lugs or the like secured to the roof to extend therein.

With a construction wherein the roof is held within opposed U-shaped channel members at the windshield frame and the roll yoke, it is additionally provided that the roof is variable in its longitudinal length, that is in the driving direction of the vehicle so that it may be extensible and contractible. The roof is preferably constructed of at least two relatively displaceable sections that are guidingly connected with each other at their lateral edges.

In a construction wherein the windshield frame is the only fixed structural part of the vehicle that has a U-shaped channel mounting for the marginal edge portion of the detachable roof, the present invention employs a device secured to the roll yoke for exerting a constantly applied force upon the roof as a unit in the direction of the windshield frame. This force is preferably effective upon the roof with the interposition of elastic connecting members between the roof and the roll yoke.

In the accompanying drawings:—

Figure 1 is a partial schematic side elevation of an automotive vehicle according to the present invention;

Figure 2 is a partial cross-sectional view through the windshield frame of the automotive vehicle according to the present invention in the region of the roof taken on a longitudinally extending vertical plane;

Figure 3 is a partial cross-sectional view through the roll yoke and the immediately adjacent portion of the passenger compartment covering taken on a longitudinal plane;

Figure 4 is a partial cross-sectional view similar to Figure 3, but of a second embodiment of the present invention;

Figure 5 is a partial cross-sectional view similar to Figure 2, but transversely spaced therefrom;

Figure 6 is a further longitudinal partial cross-sectional view taken through the roll yoke similar to Figure 4 but transversely spaced therefrom;

Figures 7a and 7b are bottom views of the roof according to the embodiments of Figures 4 and 6 showing the roof in its extended and collapsed position respectively;

Figure 8 is a partial cross-sectional view taken along line VIII—VIII of Figure 7a, on an enlarged scale; and

Figure 9 is a partial cross-sectional view taken along line IX—IX of Figure 8.

As shown in Figure 1, the vehicle comprises a front end unit 1 having a windshield frame 2 carrying therein a windshield 3, a rear end unit 4, and a passenger compartment 5 (Figure 2) defined therebetween. A roll yoke 6 is secured to the rear end frame unit 4 to transversely span the passenger compartment 5. A detachable roof 7 extends between the windshield frame 2 and the roll yoke 6. A rear end cover 8 is secured between the roll yoke 6 and the rear end unit 4. The passenger compartment 5 is accessible through a door 9.

In Figure 2, the construction between the windshield frame 2 and the roof 7 is illustrated. The windshield frame 2 includes a hollow rigid box girder 12 consisting of the formed sheet metal parts 10 and 11. A Z-shaped formed sheet metal part 13 is securely connected to the girder 12 so that its legs 14, 15 form with the part 11 of the girder 12 a U-shaped channel member opening toward the roof 7; the transverse edge 16 of the roof 7 is engaged within the U-shaped channel in the installed position of the detachable roof. The edge 16 of the roof is reinforced by means of the hollow transversely elongated box-shaped member 17 constructed of formed sheet metal.

The edge 16 is provided with an elastic member 18 engaging a resilient moulded body 19 disposed in the U-shaped channel member, to thereby form a water tight seal for the forward portion of the roof 7. The elastic member 18 has a rearwardly extending integral bead 20 that extends into and is exposed to the passenger compartment 5 to constitute a shock absorber for passenger impacts upon collision. Also, the girder 12 is provided with upholstering 21 having a cover 22 fastened to the box girder 12 by means of an ornamental trim strip 23, which upholstered construction further protects the passengers in the event of a collision. A water-collecting trough 24 is formed by an indentation in the trim strip 23 and the formed sheet metal part 11.

In the construction according to Figure 3, the roof 7 extends over and covers the roll yoke 6 at a vertical spacing therefrom, to which it is connected. The roof 7 is provided with a reinforcing member 25, to which is mounted through the interposition of an elastic connecting member 26 the depending part 27 having a clamping fastener 28. A second clamping member 29 is secured to the roll yoke 6 through the interposition of an elastic connecting member 30; the fastener part 29 cooperates with the clamp fastener part 28. The roll yoke 6 comprises the formed sheet metal parts 31, 32 and 33. A slot 34 is provided for the passage of a hand lever 35 by means of which the clamp lock 28, 29 is operated from within the passenger compartment. The clamp fastener or lock 28, 29 is constructed so that it stresses the roof 7 in the direction toward the windshield frame 2 and maintains the roof 7 in this stressed condition within the U-shaped channel of the wind-

shield frame 2 as previously described with respect to Figure 2.

As shown in the modification of Figure 4, it is contemplated that the roof 7′ may be detachably mounted with respect to the roll yoke 6′ in a U-shaped channel. According to Figure 4, the roll yoke 6′ is provided with a profiled formed sheet metal part 36 that is bent angularly several times to form at the top side of the roll yoke 6′, a U-shaped channel 37 for receiving therein the rear transverse edge of the roof 7′. The roof 7′ is held in the channel 37 with the interposition of elastic sealing inserts 38, 39.

In order to accurately align the roof 7, 7′ with respect to the fixed structural frame parts, the windshield frame 2 and the roll yoke 6, 6′, the present invention provides guide means at the windshield frame and at the roll yoke. Such guide means are illustrated in Figure 5 for the construction according to Figure 2, and in Figure 6 for the embodiment according to Figure 4.

As shown in Figure 5, the formed sheet metal part 11 of the box girder 12 is provided with a channel shaped indentation 40 extending in the longitudinal direction of the vehicle, with respect to the direction of travel. The trim strip 23 is provided with a slot or aperture 41 in the zone of the indentation 40. A depending pin 42 is secured to the formed sheet metal part 17 of the roof 7, which pin 42 extends through the slot 41 into the indentation or recess 40. The slot 41 and indenation 40 are dimensioned so that the roof can be conveniently placed on the supporting surface of the box girder 12, and the edge 16 can then be pushed into the U-shaped channel formed by the sheet metal formed part 13 together with the box girder 12.

As shown in Figure 6, the roll yoke 6′ is provided with a longitudinally extending recess or indentation 43, and the formed sheet metal part 36 is provided with a longitudinally extending aperture or slot 44 aligned with and communicating with the indentation 43. A pin 45 is connected to and depends from the roof 7′ to extend with the slot 44 and indentation 43. Thereby the roof 7′ is sufficiently accurately guided with respect to the roll yoke 6′ during its insertion into the roll yoke U-shaped channel.

The roof may be detachably connected between the windshield frame according to Figures 2 and 5 and the roll yoke according to Figures 4 and 6. For such a detachable connection, the roof is preferably constructed to be expandable and contractable longitudinally in the direction of the vehicle driving and is composed of at least two sections that are displaceably guided with respect to each other.

Such a roof construction is illustrated in Figures 7a, 7b, 8 and 9. The illustrated roof in these Figures is basically constructed of a synthetic material, whereas the roof 7 or 7′ previously illustrated is constructed of rigidly mounted sheet metal parts. However, it is contemplated that either a sheet metal roof or a synthetic material roof may be provided with the construction according to Figures 2 and 3, or the construction according to Figures 2 and 4, or the construction according to a combination of Figures 2—4; any of which constructions may be provided with the guide means illustrated in Figures 5, 6.

As shown in Figures 7a, 7b, 8 and 9, the synthetic material roof comprises two sections 46, 47. The transverse edge 48 of the roof section 47 overlaps the transverse edge 49 of the roof section 46. The roof section 46 has an appropriately formed transverse forward edge 50 for cooperating with the U-shaped channel of the windshield frame, and the roof section 47 has a correspondingly formed transverse edge 51 for cooperating with a roll yoke as illustrated, for example, in Figures 2 and 5, or Figures 4 and 6. In Figure 7a, one half of the roof is illustrated in its entire length, that is expanded longitudinally to its maximum longitudinal direction between the windshield frame (not shown) and the roll yoke (not shown) in the assembled position of the roof; it being understood that the other transverse side of the roof would be a mirror image of the illustrated side. In Figure 7b, the other half of the roof is shown in the telescoped or contracted position for disassembly of the roof; the position of the roof with respect to the roll yoke and windshield frame in this position are also illustrated in Figures 5 and 6. Similarly, the other half of the roof illustrated in Figure 7b would be a mirror image.

The two roof sections 46, 47 are connected to each other by foldable linkages 52, 53 that are mounted to longitudinally extend along the lateral edges of the roof, that is above the door opening. The linkage 52, for example, consists of two bars 54, 55 being pivotally connected by means of pins 56, 57 to the roof sections 46, 47, respectively, and being rotatably mounted together by means of a hinge pin 58 (Figure 9). In the expanded stressed condition of the roof, the bars 54, 55 are maintained in aligned position by means of a locking member 59. In order to release the locking member 59, a handle 60 is provided for moving the detent element 61 that is mounted on the resilient leaf spring tongue 62 out of engagement with a corresponding aperture in the bar 54; thereafter, the linkage may be inwardly folded about the pin 58 as shown in Figure 7b. An elastic sealing member 63 is secured to the bars 54, 55 for sealing engagement with respect to the door 64 and to simultaneously form a seal between the bars and the roof. A member 65 is rigidly secured to the transverse edge of the roof for cooperation with the bars. As

seen in Figure 8, the bar 55, for example, has a flange 66 with an inclined leading cam surface 67 cooperatively engaging with a correspondingly inclined surface of the member 65 to maintain the roof sections 46, 47 under tension at their connection with the bars.

To provide for shifting of the roof sections 46, 47 during collapsing or retracting of the roof, the members 65 are shortened at 68 as illustrated in Figure 7a. Also, it is contemplated that an intermediate layer of felt material or the like may be provided between the roof sections 46, 47 where they are in overlapping engagement to facilitate the relative sliding of the sections with respect to each other and to simultaneously provide a sealing of the transversely extending slot between the roof sections 46 and 47.

WHAT WE CLAIM IS:—

1. An automotive vehicle having a substantially rigid vehicle body forming a passenger compartment and provided with a windshield frame member and a rear frame member with a readily detachable roof extending between and attached to the frame members, at least one of said frame members forming a transversely extending generally U-shaped channel opening toward the roof, said roof having a transverse edge extending into said U-shaped channel and means for moving said roof transverse edge into said U-shaped channel.

2. A vehicle according to claim 1, wherein said U-shaped channel and said roof transverse edge are each provided with elastic sealing means which engage one another when the roof is closed.

3. A vehicle according to claim 1 or 2, wherein said one frame member includes a hollow transversely extending rigid girder mounted below said U-shaped channel.

4. A vehicle according to claim 3, wherein said girder has a transversely extending, upwardly facing support surface for supporting said roof separately from said U-shaped channel.

5. A vehicle according to claim 4, including resilient support means between said support surface and said roof.

6. A vehicle according to claim 5, wherein said resilient support means includes a transversely extending bead exposed to the passenger compartment to provide a shock absorber for preventing passenger collision injuries.

7. A vehicle according to any of the preceding claims wherein said one frame member is provided with means separate from said U-shaped channel for guiding said roof during the insertion of said roof transverse edge into said U-shaped channel.

8. A vehicle according to claim 7, wherein said guiding means include at least one pin connected to said roof and a guide aperture extending longitudinally with respect to the direction of vehicle travel, receiving therein said pin.

9. A vehicle according to any of the preceding claims, including said means for moving said transverse edge being operable for selectively changing the longitudinal dimension, as measured in the direction of vehicle travel, of said roof.

10. A vehicle according to claim 9, wherein said means for moving said transverse edge includes said roof having a plurality of rigid sections longitudinally displaceable with respect to each other and having guide means along their lateral edges connecting said sections together.

11. A vehicle according to any of the preceding claims, wherein said one member is said windshield frame and said rear frame member is a roll yoke extending transversely over the passenger compartment and provided with additional means for urging said roof, as a unit, in the direction toward said windshield frame member.

12. A vehicle according to claim 11, wherein said additional means provides a resilient connection between said roof and said roll yoke.

13. A vehicle according to claim 11 or 12, in their appendancy to claim 10 wherein said roof comprises at least two rigid sections extending the full transverse width of said roof and overlapping each other, said means for moving said transverse edge being operable to move said roof sections longitudinally with respect to each other and including a plurality of pivotally connected links pivotally connected to said roof sections.

14. A vehicle according to claim 13, wherein said links are collapsable inwardly to shorten the longitudinal dimension of said roof and extensible outwardly to lengthen the longitudinal dimension of said roof, said links having cam surfaces along substantially their entire longitudinal outer length, said roof sections having inwardly extending cam surfaces along substantially their entire longitudinal length engaging said link cam surfaces upon extension of said links to stress said roof sections transversely and downwardly.

15. A vehicle according to claim 13 or 14, wherein two adjacent pivotally connected links are provided with means locking them together in their extended position comprising a leaf spring securely mounted at one end to one of said two adjacent pivotally connected links and having at its other end a pin, and the other of said two adjacent pivotally connected links having an aperture for receiving therein said leaf spring pin only in the extended position of said links.

16. A vehicle according to claim 1, wherein each of said frame members is provided with a transversely extending U-shaped channel

and said roof is provided with opposed transverse edges extending in respective ones of said U-shaped channels.

17. An automotive vehicle substantially as described with reference to Figures 1 to 3, or Figures 1 to 3 as modified by Figures 4 to 9 of the accompanying drawings.

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Agents for the Applicant(s).

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